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THREAT DETECTION TRAINING PROGRAMS FOR CHILD PEDESTRIAN SAFETY. VOLUME II. PROGRAM TRAINING MATERIALS

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16. Abstract

Research aim was to identify efficient, safe, street-crossing behavior sequence for children; develop/pilot-test programs to train sequence in public schools. Target audience: Kindergarten-to-third graders in urban schools. Phase I work included behavioral analysis to find optimum street-crossing behavior sequence; evaluate behavior-modification techniques; investigate constraints (cost, school resource limitations, school personnel training/attitudes).

Phase II developed three programs evaluated for adequacy, feasibility, cost by project staff, consultants, six school principals, 11 teachers: (1) Basic Program--teacher introduces program, behavior sequence; children practice sequence through games played on lo-fi simulated classroom "street" and later on real streets (traffic blocked). (2) Film Program--same as Basic, except program, behavior sequence introduced via film starring Captain Kangaroo. (3) Simulator Program--same as Basic, except children practice sequence in hi-fi classroom simulator, using two rear-projected synchronized color films of moving traffic.

Phase III pilot-tested training programs in three urban Pittsburgh schools re effectiveness, permanency, training-materials adequacy, using one pretest, two posttests. All three programs considerably reduced unsafe street-crossing behavior. Film, Simulator programs were generally superior to Basic; little difference between Film and Simulator programs in effectiveness, permanency. Recommended Film, Simulator programs undergo further testing.

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PREFACE

The author wishes to thank the teachers and principals of three Pittsburgh-area elementary schools--Conroy, Morningside, and Lemington--and the Pittsburgh Board of Public Education for their cooperation and participation in the conduct of this project. Thanks are also due to Margaret Nesbitt and Sherry Wiltman for significant technical contributions to the project, including conceptualizing project conduct and development of the training film; and to Deborah Schultz for data collection in the schools and production of this report.

The author also expresses special gratitude to his wife, Susan, who helped extensively in the data collection and statistical analysis, and contributed so much to the spirit of the project and quality and thoroughness of this report.

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INTRODUCTION

This report, in two volumes, documents a project to develop and test child pedestrian safety training programs, as performed by Applied Science Associates, Inc. (ASA). The project was sponsored by the Research Institute, National Highway Traffic Safety Administration, within the U. S. Department of Transportation.

The aim of the effort was to produce training programs which employ behavior modification techniques to teach safe street-crossing behavior to children in the five-to-nine age group. The programs were designed for use by elementary schools, particularly in urban or center-city areas where accidents involving child pedestrians most often occur.

The project involved three phases, the goals of which were:

1. Phase I - to perform various analyses required to define the content and structure of the training programs.

2. Phase II - to outline various training program alternatives, select three, develop them into ready-to-administer training programs, and make preparations for pilot testing.

3. Phase III - to pilot-test the training programs, evaluate the results, modify the programs, and make recommendations for future training program development.

In this final report on the project, Volume 1 describes how the project was carried out, the pilot test results and conclusions, and recommendations for program modifications and further program testing. Volume 2 provides appendices, including the content of program-user guides and descriptions/specifications of all other program materials.

CONDUCT OF THE PROJECT

Phase I

The major effort in Phase I was to identify and describe (1) the safe street-crossing behaviors to be conditioned in the training, (2) usable behavior modification techniques, and (3) practical constraints affecting the structure of the training. These analyses provided inputs to the development of a set of training specifications.

Behavioral Analysis

The purposes of the behavioral analysis were to determine precisely what behaviors were to be conditioned in the training programs, to what critical stimuli conditioning was to occur, and how the results of training were to be measured. The conduct of the behavioral analysis involved six activities, as described below:

1. Collection of Behavior-Related Accident Data. The initial step in the behavioral analysis was the collection of data relating to:

    a. Descriptions of typical child pedestrian accidents, including predisposing and precipitating situational factors such as location, time of occurrence, and frequency/severity of occurrence to children in the kindergarten-to-grade-three age group.

    b. Child pedestrian behaviors (resulting in accidents or near-accidents) such as the child's activity prior to the accident, the child's object of attention prior to and during the accident, the child's search and detection activity, and the child's evasive action (if any).

The sources of such data included the National Safety Council, the Pennsylvania State Department of Transportation, the Highway Users' Foundation, the Western Pennsylvania Safety Council, and the American Automobile Association (National Headquarters and Pittsburgh Office). The major data source, however, was the NHTSA pedestrian accident study.[1]

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[1] Snyder, Monroe B., et al. Pedestrian safety. The identification of precipitating factors and possible countermeasures. Volumes I and II. Springfield, Virginia: National Technical Information Service, 1971.

2. Determination of Tentative Training Emphasis. The second step in the analysis was the definition of the training emphasis, i.e., the goals or focus of the to-be-developed training programs. The accident data were reviewed and a set of tentative program goals established, subject to modification based on the results of the analyses of behavior, behavior modification techniques, and constraints.

Tentative decisions concerning training emphasis were made in two areas:

a. Which aspects of the street-crossing behavior sequence--search, detection, evaluation, decision making, human action--should be included in the training programs.

b. Which of the eight accident types which commonly victimize children, as identified from the NHTSA pedestrian accident study, should the training be designed to combat.

The philosophy employed in establishing the program goals was to try to achieve as much with the training as possible, consistent with NHTSA expectations and already known or highly probable constraints.

3. Definition of Accident-Related Behavior Sequences. Behavior sequences based on the accident data were defined for five of the eight child-involving accident types. Each behavior sequence was described in terms of a chain of discrete stimuli and responses beginning with the initiating stimulus (e.g., perception of friend on the other side of the street) and ending with the accident or near-accident. Predisposing factors, target group factors, and environmental conditions were considered in terms of their effect on the stimulus-response chain (e.g., the presence or absence of parked cars would affect the point at which the stimulus of the threatening vehicle would be first observable by the child). Responses were defined at the level of head, eye, and body movements.

The results of this activity were descriptions, in stimulus-response terms, of the behavior sequences which typically lead to the selected accident types.

4. Definition of Accident Avoidance Behavior Sequences. Having defined the behavior sequences which typically lead to accidents, the next step involved analyzing these sequences and defining parallel behavior sequences which would result in accident avoidance. All situational characteristics which could act as critical stimuli to accident avoidance behaviors were identified. Such critical stimuli included parked cars, street width, sight of approaching vehicle, and the child's own behavior (e.g., running). Accident avoidance sequences were then modeled to define the responses which must be added to insure avoidance of the accident, using the situational characteristics as critical stimuli to elicit the required accident avoidance behaviors. Examples of added responses are

stopping and left/right head-and-eye movements. Certain other responses (e.g., running) were identified which might have to be deleted from the behavior sequence or replaced by another response (e.g., walking).

Where possible, multiple cues were paired to the required behaviors to account for variations in situation, i.e., to increase response generalization. For example, conditioning a child to stop before proceeding into the street from between parked cars might mean that the child would not stop if no parked cars were present. For this reason, additional critical stimuli (e.g., the edge of the roadway) were associated with the stopping response.

The results of the modeling of accident avoidance behavior sequences were descriptions, in stimulus-response terms, of behavior sequences which would result in avoiding the accident types in question.

The accident avoidance behavior sequences for each selected accident type were compared for their similarity with the dart-out (first half) type. Similarity of critical stimuli and responses to be conditioned were evaluated to determine which accident avoidance sequences could be combined. One accident type was eliminated at this point because its accident avoidance behavior sequence was dissimilar from the others. A single composite accident avoidance sequence, which would lead to the avoidance of all four remaining accident types, was defined.[2]

5. Evaluation of the Response Capabilities of the Subject Group. Once the composite accident avoidance behavior sequence was modeled, it was evaluated to determine the extent to which it could be practically conditioned in the kindergarten-to-third-grade (K-3) subject group. Of primary concern were the judgment and decision-making aspects of the behavior sequence. It can be assumed that as a child ages he is able to make increasingly reliable discriminations concerning whether an oncoming car is too close or moving too fast to permit him to cross the street safely. The determination had to be made at what age the child can be assumed to possess a sufficient level of this ability.

In practical terms, it had to be decided at what age a child, with an acceptable amount of practice, could be conditioned to demonstrate totally correct performance of the accident avoidance behavior sequence, including "cross/don't cross" decisions. What constitutes an "acceptable" level of practice was determined based on assumptions concerning how training might be carried out and the availability of training time in the schools. Again, these assumptions were to be verified (or modified) in accordance with the results of the behavior modification techniques analysis and the constraints analysis.

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[2] The accident types which the composite accident avoidance sequence was designed to counter were Dart-Out (first half), Dart-Out (second half), Pedestrian Strikes Vehicle, and Vendor-Ice Cream Truck. A description of these causal types can be found in Volume II, Section 5 of the NHTSA pedestrian accident report previously cited.

Target group capability determinations were made, based on a survey of the child development and accident safety literature and on consultation with child psychologists at the Pittsburgh Child Guidance Center and the University of Pittsburgh. The literature was examined and the experts polled to determine both anecdotal and formal data concerning each critical response in the behavior sequence. Emphasis was placed on finding previous attempts to condition these or similar responses, the degree of success, and the training time (i.e., number of trials required).

6. Determination of Measurement Techniques and Measures. The final step in the behavioral analysis was to determine how baseline and post-training street crossing behavior data would be collected in Phase III of the project, the Training Program Evaluation. This activity involved both definition of measurement situations and the measures themselves.

Two categories of measurement situation were identified:

a. Outside test situations. This measurement technique involved setting up controlled test situations in the natural environment.

b. Naturalistic observation. With this technique the behaviors of the subject children would be observed outside but without attempting to structure or interfere with the environment except in the case of danger to the child.

In defining measurement approaches, emphasis was placed on outside situations because they offered more control than naturalistic observation. Alternate outside and naturalistic situations were defined which would permit the observation and measurement of the children's street-crossing behavior. In order to be judged acceptable each measurement situation had to:

a. Be safe for the children.

b. Be easy to set up and administer.

c. "Sound reasonable," so that the children would not suspect that they were being observed.

d. Fit reasonably well within the scope of normal school activities.

e. Permit pre/post behavior comparison on individual children.

Measures were then defined for all responses in the accident avoidance behavioral sequence. Each measure was defined so as to permit a yes/no judgment on the part of the observer concerning whether or not the response was performed as defined by the response sequence.

Analysis of Behavior Modification Techniques

The second analysis performed in Phase I was the evaluation and selection of behavior modification techniques usable in conditioning the accident avoidance behavior sequence. The analysis involved three activities.

1. Development of a List of Techniques. The first step in the analysis was the development of a tentative list of major techniques and their variants, drawing upon the combined knowledge of the ASA project staff and ASA consultants.[3] The goal was to develop a complete list of different techniques now employed in clinical and educational practice. The activity was accomplished by critical review of the behavior modification literature. Each technique was described in terms of the operant and respondent conditioning principles upon which it is based and how it is applied in practice.

2. Evaluation of Techniques. Each technique was then examined to determine the extent to which it would be usable in conditioning the critical responses in the accident avoidance behavioral sequence. As a first step in determining the usable techniques, the accident avoidance behavior sequence was analyzed to categorize, in a behaviorally meaningful manner, the responses to be conditioned. This analysis revealed that to condition the accident avoidance behavior sequence would require two types of behavior modification:

a. Addition of responses, i.e., the conditioning of responses not now reliably present in the child's street-crossing behavior sequence. The added responses were left-and-right head-and-eye movements.

b. Replacement of responses, i.e., replacing maladaptive responses now in the child's street-crossing behavior sequence with responses which would lead to accident avoidance. (Replacement differs from simple addition of responses in that replacement involves two incompatible responses. One is ignored or negatively reinforced to reduce its probability of occurrence, and the other is positively reinforced to increase its probability of occurrence.) The replacement responses in the accident avoidance behavior sequence were stopping at the appropriate wait position (replacing

[3] The consultants involved in this activity were Dr. James Holland (Learning Research and Development Center, University of Pittsburgh), Dr. Donald Baer (University of Kansas), and Dr. Donald Wildemann (University of North Carolina, Greensboro).

walking or running), waiting (replacing immediate initiation of walking or running), walking (replacing running), and taking the most direct path (replacing oblique or meandering paths).

In order to be considered tentatively usable, any behavior modification technique identified had to be applicable to one or both of these categories.

Review of the behavior modification literature led to the identification of 23 distinguishable, but often overlapping, techniques based on the principles of classical and operant conditioning. Techniques were identified that were obviously not appropriate to conditioning the avoidance sequence responses. Others were found to be nonusable because they did not specifically apply to either of the two types of conditioning categories described above. Basically, there were four reasons why a technique was judged nonusable:

a. It seemed principally designed for use in psychotherapy, and modification to accident avoidance conditioning appeared impractical.

b. It was employed to condition emotional or nonvoluntary responses as opposed to motor responses.

c. It was not sufficiently well described in the available literature to permit proper evaluation of its usefulness in accident avoidance conditioning.

d. It was not practically implementable, given the responses to be conditioned.

The output of the initial evaluation was a set of techniques which were potentially usable in conditioning accident avoidance behaviors. These techniques were then categorized according to type of conditioning--response adding or response replacement--to which they could be applied. A third category--subject-controlled techniques--was added to include those techniques, useful both in adding and replacing responses, in which the person being conditioned exercises conscious control over the conditioning process.

Once the techniques had been categorized, the techniques in each category were comparatively evaluated. Techniques were compared on eight dimensions:

a. Previous applications--the degree of similarity between previous applications of the technique and the present requirements (i.e., normal children, aged 5 to 9, in a school setting).

b. Empirical validation--the frequency with which techniques had demonstrated significant behavior change as compared to a control group.

c. Transfer of training--the amount of transfer between training and outside situations demonstrated in the available literature.

d. Permanency of training--the greatest period of time, as described in the available literature, a technique had demonstrated persistence of the conditioned behavior.

e. Training time requirements--the relative speed with which conditioning of the accident avoidance responses could be effected.

f. Support requirements--the quantity and extent of equipment, materials, and other special support requirements for implementing the technique.

g. Training required to administer technique--the amount of training required for behavior science nonprofessionals (e.g., teachers and teacher aides) to learn to administer the techniques.

h. Possible advantages/disadvantages--this final category was included to permit listing of particular strengths and weaknesses of each technique relative to the conditioning of accident avoidance responses.

3. Selection of Techniques. Using the ratings and rankings of the evaluation dimensions and the advantages/disadvantages listings, an overall preference ordering was determined for techniques within each category. Based on this evaluation, a set of techniques was selected for eliciting the required behaviors and for reinforcing them once they were exhibited. These techniques were:

a. For eliciting the behavior sequence:

(1) Teacher-directed prompting and guidance.

(2) Behavioral rehearsal, i.e., practice without reinforcement under low threat-of-failure circumstances.

(3) Symbolic and vicarious modeling, using the teacher and a child-prestigious personality as a model.

b. For reinforcement of the behavior sequence:

(1) Direct positive reinforcement.

(2) Secondary reinforcement, specifically the use of tokens to be redeemed for tangible and/or intangible (e.g., privileges) rewards.

(3) Negative reinforcement, only in the form of mild reprimand.

Constraints Analysis

The purpose of the constraints analysis was to identify and describe those factors which will have practical implications for the content and structure of the training programs, particularly with regard to the practical usability of the training programs in the schools. These concerns and some of the constraints related to them are:

1. The elementary school as the ultimate training site. Constraining factors which were examined included:

   a. Possible limitations on the types of training programs that will be approved by school districts for use within the target grades.

   b. Possible time and scheduling limitations.

   c. Limitations in the availability of physical space (e.g., for deploying a game or simulator) and/or equipment (e.g., projectors, tape recorders).

   d. Availability of other personnel (e.g., teacher aides) who could administer or assist in administering the training programs.

2. Cost considerations. Constraining factors included:

   a. Funds available in the school budget for purchasing/renting a child pedestrian safety training program.

   b. Funds available through Federal and State sources for defraying costs of purchase/rental and/or administration.

3. School personnel as the ultimate users of the programs. Constraining factors here included:

   a. Attitudes of school personnel toward child pedestrian safety programs and preferences as to program structure.

   b. Attitudes of likely program administrators toward behavior modification.

   c. Background and training of likely program administrators, particularly regarding knowledge and experience concerning behavior modification techniques.

   d. Possible training program design features which might facilitate (or make difficult) the administration of a child pedestrian training program.

ASA compiled an exhaustive list of possible constraining factors, including those listed above, and developed a semistructured interview format to be used in interviews with principals, teachers, and parents. Six urban elementary schools in the Pittsburgh center city area were included in the constraints analysis. School personnel and parents were interviewed in person, in groups of 4-5 persons, in each of their respective schools.

Prior to the group interviews, ASA discussed the contract objectives and conducted interviews with representatives of the Pittsburgh Board of Education. Information obtained from these respondents (e.g., cost considerations, Board policies of program approval) allowed the group interviews to be focused more directly on the educational and attitudinal constraints.

The data gathered in the constraints analysis were compiled and summarized to provide a factor-by-factor description of constraints and their implications for training development. The tentative training emphasis, the accident avoidance behavior sequence, and the set of selected behavior modification techniques were reviewed to assure that they were not discrepant with the constraints analysis findings.

Development of Training Specifications

The final task in Phase I was the development of training specifications based on the results of the analyses of behavior, behavior modification technique, and constraints. The output of this task was a set of

training specifications describing the essential features to be designed into the training programs. The specifications included the following items:

1. A precise statement of the behavioral objectives to be attained as a result of training.

2. The composite accident avoidance behavior sequence, including critical elements (stimuli) of the accident environment which need to be represented in the training.

3. Quantitative measures of search and of detection behavior to be used in evaluating program effectiveness.

4. The specific learning/behavior modification principles, paradigm(s), or techniques to be employed.

5. Approximate time/quantity estimates available for the training, i.e., session length and number of sessions per term.

6. All performance criteria.

7. The measurement situations to be employed.

8. Precise statements of all constraints to be employed in the design of training programs.

Phase II

The primary activities of Phase II were the development of outlines for six alternative child pedestrian safety training programs, final specification of three of the six programs, production of training program materials, and developmental testing of some of these materials. The conduct of each of these activities is described separately in the sections which follow.

Development and Evaluation of Alternative Training Programs

Development of the Outlines. The first task in Phase II was to transform the findings of Phase I into a set of outlines for alternative programs to teach safe street crossing to the K-3 target population. The behavioral analysis, analysis of behavior modification techniques, and the

constraints analysis of Phase I had resulted in two products which formed the basis for the outlines:

1. Program sketches, developed to aid in the constraints analysis.

2. Training specifications.

The program sketches were modified and expanded in accordance with the specification to produce six alternative training program outlines, each describing a different training approach:

1. Teacher/Outside Program--Primarily teacher-guided outside training sessions, requiring minimal materials (tokens, record forms, award badges), and using actual street situations for most sessions.

2. Lo-Fi Program--Teacher-guided low-fidelity simulation using quarter-scale model cardboard cars for half the sessions, and actual street situations for the other half.

3. Film Program--Same as Teacher/Outside Program, except a film of a child-prestigious personality teaches the response sequence.

4. Hi-Fi Program--Simulation using two synchronized rear-project films of moving traffic, stereo traffic sounds, and cardboard mock-ups of parked cars.

5. Film/Natural Outside Program--Similar to Film Program, but uses crossing guards, parent volunteers, and aides to reinforce correct responses as children routinely walk to and from school.

6. Self-Control Program--Requires self-observation and self-assessment of street crossing behavior by child, and reporting performance to the teacher.

Each approach was described in terms of:

1. General overview of the program, in an introduction/overview section.

2. Training materials required to administer the program.

3. Method of establishing the response sequence, i.e., the teaching techniques that would be used to introduce the children to the accident avoidance behavior sequence.

4. Type of training situation to be employed, i.e., the techniques to be employed in having the children practice the accident avoidance behavior sequence.

5. Training scenario, a session-by-session description of the program.

Evaluation of the Outlines. Once developed, the six training program approaches were subjected to a comparative evaluation to determine both technical adequacy/feasibility and cost.

The adequacy/feasibility evaluation was carried out by submitting the six training program outlines to review by two types of program-knowledgeable respondents.

1. Behavior Modification Consultants. The same three consultants who provided data during the selection of behavior modification techniques for use in the programs were asked to evaluate the adequacy of each training approach on theoretical grounds.

2. Elementary School Teachers and Principals. The teachers and principals who participated in the constraints analysis were asked to review the training approaches to identify any practical problems that might arise in trying to administer the programs within the schools. Six principals and 11 teachers participated.

Each reviewer was asked to rank the programs and provide comments in support of their ranking.

Given that the program outlines specified the training materials required for administering each program, it was possible to derive an estimate of the cost, in training materials, required to administer each program. In arriving at the cost figures for each program, two assumptions were made:

1. With the exception of the traffic-flow simulator used in one of the programs, at least 200 sets of materials would be produced for each program. Thus, the cost of a given set of program materials would reflect lower bulk-purchase rates.

2. Except for the pedestrian safety film used in one of the programs, cost for developing materials was not included in determining materials costs.

Given the assumptions, the cost of producing the various program materials was determined by the project staff using current (October 1973) quotations from representative materials producers and ASA's Graphic Arts/Printing department.

Presentation of Program Recommendations. The adequacy/feasibility and cost evaluation data were considered, together with the background knowledge of the project staff, to develop an overall preference ranking of the programs. The objective was to order the programs from the point of view of both theory and practicality. An evaluation was then written for each program to summarize the rationale for its rank.

The final step in the evaluation process was to summarize the evaluations into a specific set of recommendations as to which programs should be developed and tested. These recommendations were submitted to the Research Institute along with the evaluation data upon which they were based.

Specification of To-Be-Developed Training Programs

After program recommendations had been reviewed, meetings were held between ASA and the Research Institute to determine the final specifications for the to-be-developed child pedestrian safety training programs. The meetings served two functions:

1. To reach agreement concerning which three of the six training program approaches would be developed and tested.

2. To specify revisions in the chosen training programs from the outlines developed by ASA.

Three programs were defined that included the best essential aspects of the six alternative programs proposed. The three (which were retitled) were:

1. The Basic (or Lo-Fi) Program. This was the simplest of the three, and involved having the teacher introduce the program and the safe street crossing sequence, and then provide reinforced practice of the sequence using practice games and simulated streets in-class. The simulated street involved the use of mock-up automobiles that the children could stand inside and push around the simulated "streets."

2. The Simulator (or Hi-Fi) Program. The basic format of this program was similar to the Lo-Fi program except that the in-class practice sessions involved the playing of the practice games in a traffic flow simulator. The simulator involved use of two synchronized rear-projection systems to simulate left and right approaching traffic.

3. The Film Program. Again, this program was basically similar to the Lo-Fi program except that the program and the safe street crossing behavior sequence were introduced and demonstrated using a film featuring a child-prestigious personality (Captain Kangaroo).

Further description of the programs is provided in later sections of this report.

Production of Training Materials

Once the general specifications were agreed upon, development of the program training materials began. The development of the major items is discussed below, and the materials themselves are described in Volume 2.

Pedestrian Safety Film. A critical feature of one training approach was the use of a 15-minute film in which a child-prestigious personality modeled the accident-avoidance behavior sequence and rewarded children for correctly performing the sequence.

The first step in the production of the film was the selection of the personality, according to the following criteria:

1. Breadth of Appeal. The personality had to be known and admired by K-3 children of various races and ethnic backgrounds.

2. Reality. The personality had to be a "real-life" character, as opposed to a cartoon or "super-hero" character. It was feared that the use of an unreal character would detract from the film's message of auto traffic as a real and present danger.

3. Longevity. An important concern was that the character chosen have a reasonably long hisotry of popularity with the target group children. This would help to assure that the film, once produced, would continue to have appeal.

A list of possible candidates was examined by the project staff and narrowed down to three possibilities. Discussions were then conducted with the three to determine interest and availability. The personality selected for the film was Robert Keeshan, CBS Television's "Captain Kangaroo."

At the same time the personality was being selected, the film script/storyboard was written. In writing the script/storyboard, the objectives were to provide:

1. Repeated demonstration of the accident avoidance behavior sequence.

2. Motivation to learn the sequence, through the model's approval of the sequence (symbolic modeling) and his rewarding of representative target-group children for their performance of the sequence (vicarious modeling).

3. Audience participation, through having the personality ask questions of the audience.

4. Entertainment, through the occasional use of comic relief.

The compiled script/storyboard was reviewed by the personality to assure that his lines and actions were "in character," and by the Research Institute.

Originally, it was intended that the film would be made either in New York City or in Pittsburgh. However, because the script called entirely for outdoor scenes, and the schedule required filming in February, consideration was given to a location with better February weather. Several cities were considered and rejected either because of travel costs or lack of representative center-city street settings. Washington, D. C. was selected as a compromise, since it had representative settings, relative nearness, and somewhat warmer temperatures. In filming, locales for the various scenes were chose to reflect a typical Washington low-income, mixed-racial, center-city neighborhood.

Simulator. Another major program material item was a simulator to reproduce the critical stimuli of a typical urban residential street setting. The simulator provided continuous traffic flow using two synchronized rear-screen projection systems and stereo sound, and parked-car mock-ups.

The first step in producing the simulator was to perform an initial low-cost evaluation of the feasibility of the simulator approach. This effort involved:

1. Review of the initial plans for the simulator to identify problems in making and projecting the traffic-flow film, especially problems of synchronization.

2. Making demonstration film of representative traffic flow using a single, Super-8 silent camera to uncover possible problems in:

    a. Making the film
    b. Site selection
    c. Technical acceptability of the film

Examination of the demonstration film and information from ASA's film consultant resulted in initial specifications for the simulator and establishment of the technique for producing the traffic-flow film.

Work then began on refining the simulator specifications to the point where they could be used to construct a working prototype. Developing the prototype specifications involved:

1. Production of experimental film footage. Twelve minutes of 16mm sound film footage was shot, using two cameras positioned in a standard setting to simultaneously record the left and right views of traffic flow. The film was edited to produce a set of films having four 3-minute traffic-flow scenes.

2. Experimentation with simulator configuration. Two 6-by-8 foot rear-projection screens were constructed and used with 16mm projectors and the experimental films to try out various simulator configurations.

Based upon the results of the simulator experimentation, a set of prototype specifications was developed to detail the following aspects of the simulator:

1. Characteristics of the traffic-flow film footage, including the technique used to produce it.

2. Configuration of the simulator, i.e., placement of the various components of the simulator relative to one another.

3. Projector characteristics.

4. Design of the projector synchronization circuitry.

5. Design of the rear-projection screens.

6. Design of the car mock-ups.

The final step in developing the simulator was to implement the prototype specifications, i.e., construct and assemble the simulator and produce the final traffic-flow film footage in conformance with the specifications. Both construction of the simulator and production of the film were performed by the ASA project staff. Technical aid in the film production was supplied by Nova Productions, Inc., ASA's film consultant for the simulator development.

Practice Games. One type of training material common to all three training programs was the practice game. Its purpose was to permit the child to practice the accident avoidance behavior sequence as part of play activities associated with dart-out accidents. Three practice games were developed to be used with all of the training programs. The games were required to meet the following criteria:

1. Each game had to involve one of the following activities commonly associated with dart-out accidents:

    a. Chasing an object, e.g., ball or pet, into the street.

    b. Being pursued into the street.

    c. Crossing the street in excitement to join someone (e.g., teacher, friend, parent) on the other side.

2. Each game had to permit the players to cross the street, but only as an incidental part of playing the game, not as an end in itself.

3. The games had to be simple enough to be learned by kindergarten children. Thus, they should involve only a very few rules.

4. The games had to be stimulating and interesting enough to sustain the interest of third grade children.

5. The duration of each game could not exceed about 20 minutes (i.e., each child should have had at least one turn) since this is the longest span of attention that can be expected of the target group.

6. Since individual or team competition has little value to the kindergarten and first grade children, the games had to be enjoyable for their own sake as well as providing satisfaction in winning.

7. The games had to provide relatively frequent activity for each player, i.e., inactive waiting time between turns had to be minimized, in order to maintain the interest of the children.

8. For ease of implementation, the games could not require more than one teacher and one aide to administer.

9. In order to be practical as an in-class activity, the physical area to be used for a game could not exceed one-half the dimensions of a typical elementary classroom, i.e., no more than 20 feet by 40 feet should be required.

10. The games had to be designed to accommodate the use of the simulator.

Car Mock-Ups. In addition to the stationary car mock-ups developed for use with the simulator program, smaller car mock-ups were required for the other two programs. These mock-ups were to be pushed by the children around an area marked off as the "street" in the classroom. Their purpose was to provide targets to be searched for and detected by the children while they practice the accident avoidance behavior sequence. The mock-ups were designed to meet the following criteria:

1. Ease of use. The size and weight of the mock-ups had to be such that the target-group children could maneuver them easily.

2. Ruggedness. The mock-ups had to be able to withstand hard use by the children.

3. Portability. Since the mock-ups would have to be transported and stored, they had to be made to disassemble and/or fold easily into a compact size.

4. Safety. The mock-ups should not have sharp edges or other features which could cause injury to the children.

The initial designs and specifications for the mock-ups were provided by ASA's Graphic Arts department. Once approved by the project staff, the Graphic Arts department constructed the prototype mock-ups.

Teacher's Guides. A teacher's guide was developed for each program to provide detailed guidance to elementary school principals and teachers in preparing for and administering the program. The objective in writing each guide was to make it a complete source of all information necessary to implement the course (once the program is disseminated on a large scale, school-user personnel will have no other source of information concerning the program). Each guide provides:

1. An overview of the training program, its objectives, and the principles upon which it is based.

2. A description of each session and how it is to be conducted, including a list of DOs and DONTs for guiding the teacher's behaviors during each session.

3. Guidelines for choosing standard settings for the outside practice sessions.

4. Detailed description of what constitutes a correct response sequence, i.e., what responses should and should not be reinforced.

5. Guidelines for using the pedestrian safety awards, and for establishing school-related privileges as additional reinforcers.

6. Guidance in the effective use of social rewards (e.g., praise, smiles), including peer reaction, as reinforcement.

7. Guidelines and forms for keeping a record of student performance.

8. Directions for conducting outside training sessions periodically through the school year for the purpose of reestablishing the response sequence. Guidance was also provided to encourage the continuation of these refresher sessions into subsequent school years.

Miscellaneous Materials. In addition to the program materials described above, four other materials, common to all three programs, were developed:

1. "Street Safety Award" Patch. A two-by-three inch, three-color, embroidered patch was designed by ASA's Graphic Arts department to serve as a reward for completing the training program.

2. Award Certificate. A certificate, stating that the child has completed the program, was also created to serve as an incentive for successfully completing the program.

3. Tokens. Distinctive paper tokens were designed for use as reinforcers for some of the program sessions.

4. Progress Charts. Charts were developed to permit the teacher to record a checkmark when each child successfully completes each session. This makes it possible for the children to track their progress toward earning the patch and certificate.

Developmental Testing

The final activity in Phase II was the developmental testing of four program materials:

1. The teacher's guides

2. The practice games
3. The car mock-ups
4. The tokens

Developmental tests were conducted in two private elementary schools in suburban Pittsburgh. Although the schools were not representative of the center-city schools toward which the programs are aimed, they did provide an excellent setting within which to conduct an initial evaluation of the materials. Four kindergarten, two first grade, one second grade, and one third grade classes participated in the testing. Teachers were provided with the teacher s guide and other materials prior to the testing sessions. Testing sessions involved having the teacher conduct a training program session, using only the information provided by the teacher's guide. Each practice game was conducted in at least two of the classes. The car mock-ups were employed in all sessions.

At least one ASA project staff member was present at each session. Data were collected regarding each of the training materials:

1. Teacher's guides. Based on the teacher's comments, and how he or she administered the program session, data were gathered concerning ambiguities, lack of sufficient emphasis, and missing information in the guides.

2. Practice games. The games were observed to determine whether they were simple enough to be learned easily, were motivating and challenging to the children, and were sufficiently involving that the street crossing became incidental to the play of the game.

3. Car mock-ups. Data were collected concerning the durability of the mock-ups, the ability of the children to maneuver them, and the children's reactions to them (e.g., did the mock-ups overstimulate the children and interfere with the conduct of the training?).

4. The tokens. Of interest here was whether the tokens did have a value to the children such that they were useful in reinforcing the successful performance of the accident avoidance behavior sequence.

Based on the results of the developmental tests, revisions were made to the teacher's guides, the practice games, and the mock-ups.

Phase III

The third and final phase of the project involved pilot testing the three training programs developed in Phase II, evaluating the results, and deriving program modifications and recommendations for further program testing.

The objectives of the pilot test were to permit the gathering of four kinds of program-relevant data:

1. Program Effectiveness. How much more frequently do the subject children perform the accident avoidance behavior sequence after training, as compared to before training? Does the general adequacy of the children's street crossing performance improve with training? These data permit comparison among programs, and assessment of training transfer.

2. Program Permanency. Do the subject children continue to exhibit the behavior sequence with the passage of time?

3. Training Materials Adequacy. Are the provided materials sufficient for the effective conduct of the program? Specifically:

    a. Teacher's Guides--Completeness, clarity, and ease of use.

    b. Modeling Film--Ability to communicate to the children and hold their attention.

    c. Simulator--Ease of setup and operation; reliability; ruggedness; ability to hold attention.

    d. Car Mock-Ups--Ease of assembly, ruggedness.

    e. Practice Games--Ease of implementation by the teacher, ability to hold attention, difficulty/challenge for the children.

Preparations for Testing

The following activities were performed in preparation for the pilot testing of the three pedestrian safety training programs:

1. The ASA Project Director obtained final approval from the Pittsburgh Board of Public Education for pilot testing the three programs in the Pittsburgh Public Schools.

2. Three of the six schools which participated in the Phase I Constraints Analysis were selected to participate in the pilot testing. The schools selected were those whose physical location and normative characteristics best typified the center-city schools toward which the programs are aimed. Another criterion for selection was that the physical layout of the school lend itself to the requirements of the pretesting and posttesting. Each school was assigned randomly to one of the three training programs to be tested.

3. A planning meeting was scheduled with each of the three schools selected. The purpose of this meeting was to select one class each, K through 3, to which the program would be administered. The principal and participating teachers were then briefed concerning their roles in the testing and program administration.

4. Arrangements were made with the Pittsburgh Reading Is FUNdamental (RIF) Program to purchase books for grades K, 1, 2, and 3. These books were required for the pretest and posttest sessions, as described below.

Conduct of the Pretests

Two or three days before the training programs were scheduled to begin a pretest was conducted at each of the three schools. The measurement situation employed and the data collected are described below.

The Measurement Situation. A small truck containing a stock of RIF books was parked across the street from the school. Children were excused from class, one at a time, and told to go to the truck, select a book and return to class. No mention was made of the fact that the street must be crossed. As the child approached the street, an ASA staff member called to him/her to come to the truck. Upon leaving the truck, the child was encouraged by the staff member to hurry back to class. Each child was observed independently by two ASA staff members as he/she crossed the street, both going to the truck and returning to class.

Traffic on the street was blocked. A "plant" vehicle driven by an ASA staff person drove up and down the street at controlled intervals. The timing of the vehicle was such that, on most trials, the child experienced the vehicle which he/she had to search for, detect, and wait for, either going to or coming from the truck. Timing was effected via radio contact between the plant car and the observer closest to the van. Occasionally, mistiming occurred resulting in the plant car arriving too early or too late to be an effective target for detection. Balancing this,

however, was the fact that local traffic sometimes used the street, thus providing additional occasions for search and detection.[4]

The test setting was arranged with parked cars on the side of the street with the truck, but with no cars parked on the school side. This permitted the child to exhibit both the stop-at-curb and the stop-at-boundary behaviors. Teachers were briefed to assure that they did not tell the children that the truck was associated with the training program.

Data Collection. Response-sequence data were collected for each child. Observation of the children's street crossing behavior was structured by the use of a data form. During the testing sessions, the two ASA observers normally tape-recorded their observations using the form as a guide. After each session, the observations were transcribed to the forms. The following data items were noted for each street crossing:

1. Presearch, i.e., search responses occurring before the child came within two feet of the curb. A description of the responses was recorded (e.g., left-right, left-left-right, etc.).

2. Whether or not the child stopped, and point of stopping--curb, in the street before the boundary, or at the boundary between the parking lane and the traffic lane.

3. Predetection search, i.e., search responses at and after the curb and leading up to the visual detection of the approaching car. Where no car was coming, all search responses at and after the curb were recorded as predetection search.

4. If a car was approaching and the gap between the car and the subject was insufficient to permit a safe crossing:

    a. Direction, from child's point of view, of the car's approach.

    b. Did the child track the vehicle as it approached?

    c. Did the child wait until the vehicle passed before crossing the street?

5. Post detection search, i.e., the search responses performed by the child after the car had passed and before and/or while the child crossed the

[4] ASA staff or school crossing guards attended the barricades blocking the street and appropriately cautioned all drivers who insisted on using the street.

street. Searches performed while he was waiting for the car to pass were also recorded as post detection search.

6. General comments. Included here were unusual aspects of a child's behavior or of the street situation at the time of the crossing. Also provided was additional detail describing the child's sequence of behaviors as he crossed the street.

Administration of the Programs

Teacher Preparation. The Teacher's Guide and materials specific to the program they were to administer were provided to each of the participating teachers a few days prior to the scheduled start of the training program. The ASA project staff were available to meet with teachers as required to answer questions and assure their understanding of the program. Emphasis, however, was placed on the teacher's preparing for administration of the training program with minimal assistance, so that the self-sufficiency of the program materials could be properly assessed.

The Sessions. Once the administration of the training programs was underway, each program session was conducted by the teachers in accordance with the instructions in their Teacher's Guides. An ASA staff member was present at each training program session to collect data on materials adequacy, but guidance was provided to the teachers only as necessary to assure that the program was carried out as planned. Three circumstances required observer intervention in the conduct of the session:

1. On several occasions the regular teacher was absent and the observer was required to run the session or assist the substitute teacher in doing so.

2. One of the practice games, when used with a large class, required more personnel to administer than were sometimes available. The observer assisted as required in these cases.

3. It was originally intended that the teacher would set up and operate the simulator. Last minute technical difficulties made it necessary for ASA personnel to perform these functions. For most simulator sessions an additional observer was available to operate the simulator.

Data Collection. Two types of data relating to the adequacy of the program materials were collected during the administration of the programs:

1. Captain Kangaroo familiarity survey. Early in the program administration the subject children were

asked whether they recognized a picture of Captain Kangaroo, how well they liked him, and how much they remembered about his program.[5] The purpose of these questions was to provide an indication of the Captain's prestige value with the target group children.

2. Session data. Several types of information were collected by the observer during each session:

   a. Teacher's questions and problems in preparing for the session, especially inadequacies in the Teacher's Guide.

   b. The children's reactions to the street safety award badge, the certificate, the film, and each of the practice games.

   c. Negative and positive "critical incidents" which occurred during a session (e.g., problems in conducting the session; particularly effective teaching approaches), and general observer-generated comments and suggestions relating to the conduct of the session.

Conduct of the Posttests

Two posttests were conducted at each participating school after training was completed. The first posttest occurred within several days following the eighth and final training session of that school's program. Its purpose was to permit a before-and-after comparison with the pretest in order to determine improvement in street crossing behavior as a result of the program. The second posttest was conducted 26-28 days after the first and provided data relating to program permanency.

The conduct of the posttests was identical to the pretests, both in terms of the measurement situation and the data collection.

Data Analysis/Development of Recommendations

The final step in Phase III was to analyze the various types of data collected during the pilot testing, and to derive recommendations for:

1. Modifications to program materials.

[5] The children in the school in which the Captain Kangaroo film was to be shown were interviewed several days prior to seeing the film.

2. Recommendations for two of the three training programs for large-scale testing.

The analyses, results, conclusions, and recommendations are described in detail later in this volume.

DESCRIPTION OF THE TRAINING PROGRAMS

The previous section described the development and pilot testing of three child pedestrian training programs. Further description of the programs is provided in the following subsections of this report. The first subsection defines the accident avoidance behavior sequence which is to be imparted by the programs. The second provides a session-by-session description of the common features and basic differences among the programs. Part three describes the pedestrian safety film, which is the central feature of the Film Program. This is followed by a description of the traffic-flow simulator employed in the Simulator Program. The last subsection outlines the format and content for the Teacher's Guides which were developed for each of the programs. The Appendices referenced are in Volume 2 of this report.

The Accident Avoidance Behavior Sequence

The primary purpose of each of the training programs was the same: To reliably condition the accident avoidance behavior sequence in the K-3 target group children. The accident avoidance behavior sequence can be defined in five steps:

1. a. Stop at the edge of the curb or road if there are no parked vehicles,

   or

   b. If parked vehicles <u>are</u> present, stop at the boundary between the parking lane and traffic--beyond the parked vehicles, but still close enough to touch them.[6]

2. Turn head and eyes to the left so that the visual field includes <u>all</u> of the left traffic lane, and look for left-approaching traffic.

3. Turn head and eyes to the right so that the visual field includes <u>all</u> of the right traffic lane, and look for right-approaching traffic.

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[6] Stop-at-boundary should be employed whenever parked cars prevent a clear view of either the right or left approaching traffic lane.

4. Turn head and eyes to the left again, so that the visual field includes all of the left traffic lane, and check to be sure that the street is still clear.

5. a. Cross the street if no vehicles are detected,

or

b. If an approaching vehicle is detected in any of the searches, stop searching and track the vehicle until it passes. Repeat the left-right-left sequence and tracking of vehicles until a complete left-right-left sequence can be performed without detecting approaching traffic. Then cross the street.

All five of these steps and only these five steps constitute the correct response. Reinforcement was to be contingent upon the children's performing these steps correctly and in sequence.

The Training Programs

The Lo-Fi, Film, and Hi-Fi Programs, in their final forms, each required eight training sessions. Five of these sessions occurred in class and three outside. Six of the sessions involved the playing of three practice games. A general description of each of the sessions, including how each differs across programs, is given below. The detailed content of each session is provided by the Teacher's Guide material, in Appendix A of this report.

It should be noted that one important program-common activity is to occur prior to the beginning of any of the training programs. Two or three days prior to Session 1, the teacher is to send home with the children a pamphlet describing the program. The text of this pamphlet is included in Appendix B.

Session 1

The first training program session is devoted to:

1. A safety discussion in which the children are encouraged to relate experiences about themselves or their friends' involvement in pedestrian accidents.

2. Introducing the program, i.e., explaining the importance of street safety, showing the children the Street Safety Award patch and certificate,

and explaining how they can get them. The safety token and progress chart are also explained. The patch, certificate, token, and chart are illustrated in Appendix B.

3. Explanation/demonstration by the teacher of the accident avoidance behavior sequence.

4. Behavior rehearsal of the sequence, practice with prompting and guidance of the children as required, without reinforcement.

Session 1 is the same for the Lo-Fi and Hi-Fi Programs. The Film Program differs from the others in that the film, not the teacher, demonstrates the behavior sequence and explains the program.

The criterion for ending the session is that 95 percent of the class must have correctly performed the sequence twice.

Session 2

The purposes of Session 2 are:

1. Second explanation/demonstration of the sequence. In the Basic and Simulator programs this is done by the teacher; in the Film Program, by a second showing of the film.

2. Introduction of the street simulations. The Basic and Film Programs use "push around" car mock-ups that the children move over a "street" area marked off with tape. The car mock-ups are described in Appendix C. The Hi-Fi Program employs the traffic flow simulator. The children are shown the traffic flow simulator or are allowed to ride in the mock-ups in order to accommodate their initial curiosity.

3. Reinforced practice. The children take turns performing the sequence, using the simulation for whichever program they are in. They are reinforced with safety tokens (see Appendix B) for correct performance. Before the session can end, at least 95 percent of the class must have correctly performed the sequence three times.

Session 3

This session is the first of the practice game sessions and involves playing the Ball Toss Game in the respective simulations. The Ball Toss Game has the children taking turns throwing a ball into a basket placed

near the "curb." The positioning of the players and baskets is such that the ball will often miss the basket and go into the "street." When this happens, the child who tossed the ball must retrieve it and correctly perform the behavior sequence as he does so. He is given a token for correctly performing the sequence. In order to speed up the play, two teams are formed, and for the older children team competition can be introduced. Play is continued, within the limits of available time, until 95 percent of the class has had at least two opportunities to chase the ball into the street.

Session 4

In the fourth session, the children play the Shuttle Game in their respective simulations. In this game, three bases are set up, one of which is across the "street." The teacher (also standing across the "street") randomly selects a child and calls to him to go to one of the bases. The selection process is such that in one complete play of the game, each child will have four turns, two of which require him to cross the "street." The child must run to the base, get a safety token, and return as quickly as possible. If the child incorrectly performs the sequence while crossing the "street," he must start over again. He does not get his token until he has correctly performed the sequence. As with the Ball Toss Games, two teams are used and team competition can be introduced. Assuming two complete repetitions of the game during the training session, by the end of the session each child will have crossed the street correctly four times.

Session 5

The third practice game, the Follow-the-Leader Game, is played in the simulations during Session 5. The Follow-the-Leader Game requires each child to follow a preset path around simple obstacles to get from the start point to the end point. This path involves two street crossings. The children follow each other through the path and must go as fast as possible. If one child catches up with another and tags him, the child who tags can go ahead. If the child incorrectly performs the sequence, he also must allow the person behind to get ahead. He cannot move ahead until he correctly performs the sequence. The game is varied for older children by making the path more difficult. The game is over when all of the children have completed one circuit of the path. When the child reaches the end of the path, he is given a safety token. Assuming three complete repetitions of the game during the training session, by the end of the session each child will have performed the sequence correctly six times.

Sessions 6, 7, and 8

The final three practice sessions are identical for each program and involve outside playing of the Ball Toss Game, the Shuttle Game, and the

Follow-the-Leader Game (in that order). Where possible, each of these sessions should be played in a different standard setting. The streets must be blocked to prevent traffic flow. The same end-of-session criteria are employed as for Sessions 3, 4, and 5.

A standard setting is an outside training setting with the following characteristics:

1. Midblock location
2. Narrow (less than 40 feet wide) residential street
3. Two-way traffic flow
4. Traffic flow--light to normal
5. Traffic speed of 30 mph or less

The Pedestrian Safety Film

The Pedestrian Safety Film, key feature of the Film Program, was produced by Silvermine Films, Inc., New York City, ASA's film subcontractor. ASA produced the script/storyboard and worked closely with Silvermine on all aspects of the production. The film is a 16mm sound/color presentation about 15 minutes long. It features Captain Kangaroo (Robert Keeshan), who is supported by three children ranging in age from six to eight. The children are two boys, a white and a black, and one girl of Spanish descent.

In the film, Captain Kangaroo explains the importance of crossing the street safely, and shows the children the Safe Street Crossing Award patch they will receive when they learn how to cross the street safely. He demonstrates the sequence and then the children practice as he watches. The practice takes place over several days. Each time one of the children performs the sequence correctly, Captain Kangaroo rewards him with a safety token. At the end of each day's practice, the children turn in their tokens for a checkmark on the progress chart.

Whenever a child makes an error, the film action is frozen and the Captain asks the children in the audience what he did wrong. At the end of the film the Captain awards the three children their patches and explains to the audience that their teacher will show them how they too can get a patch. Comic relief in the film is provided via "Bunny Rabbit," a puppet character from the Captain Kangaroo TV show.

The full text of the film script is included as Appendix E.

The Traffic-Flow Simulator

The heart of the Hi-Fi Program is the traffic-flow simulator. Figure 1 illustrates the simulator as it would be configured in the classroom.

The simulator consists of two six-by-eight-foot rear projection screens set up in parallel about 12 feet apart. Wide tape is stretched from screen to screen to simulate curbs; the area between the tape lines is the "street."

Films of traffic flow are projected on the screen using Technicolor Model 1000 Super-8 cassette sound projectors. The projectors are modified:

1. To accommodate mirrors necessary to reverse the images for rear projection.

2. To provide for remote starting of the projector lamps and motors.

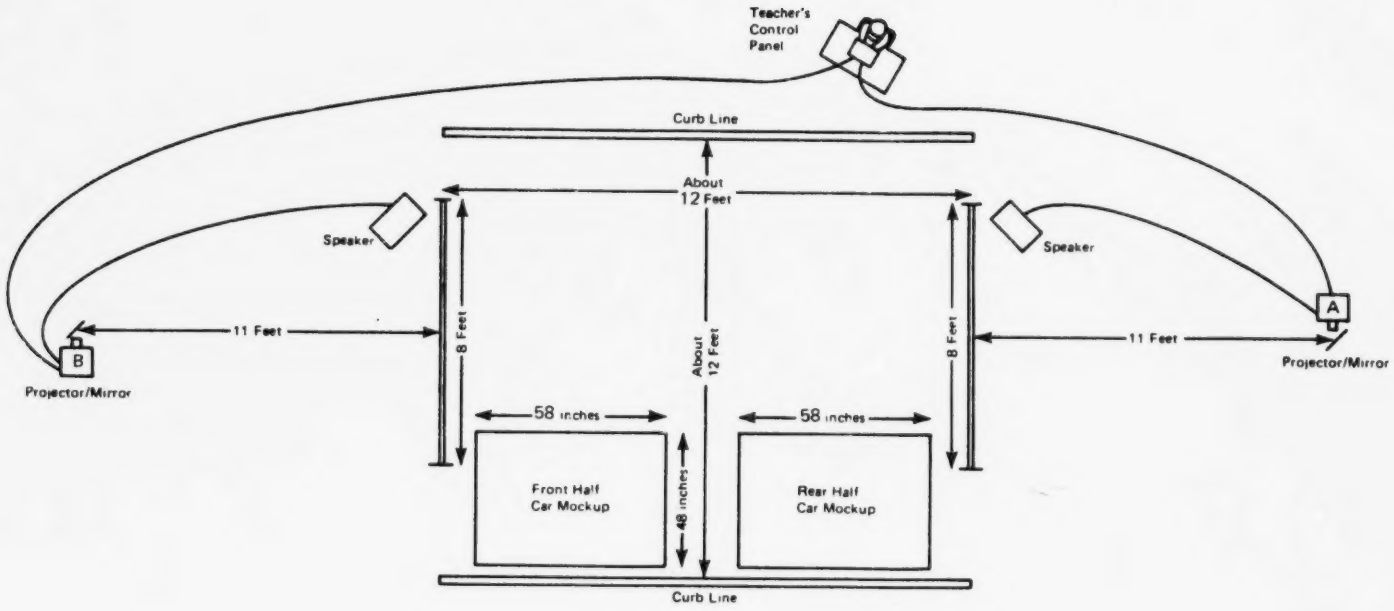
3. To permit remote control of the motor speed on one of the projectors, so that the projectors can be synchronized.

A control box is provided which connects to the projectors and permits the teacher to start both projectors simultaneously and control projector speed. A remote speaker is positioned behind each screen and is connected to the projector for that screen.

Full-scale mock-ups of compact-sized cars are provided for use in the simulated street. (See Appendix C for detailed specifications of the simulator mock-ups.) The mock-ups are constructed of light poster board with wood strip reinforcement, and finish details are rendered in line art. The two mock-ups represent the front or rear half of the vehicle. They are placed in the simulator to create a gap through which the child must pass as he crosses the street. The use of the mock-ups depends upon whether the stop-at-curb or the stop-at-boundary condition is to be practiced.

The traffic flow films were produced using a pair of 16mm Areoflex 16 BL cameras, crystal-controlled to assure exact matching of camera speed. Sound was recorded on a stereo tape recorder synchronized to the cameras.

Filming location was a standard setting except for heavier than standard traffic (to provide greater opportunity for approaching-vehicle detection). Camera height was at eye-level for the typical target-group child (about 40 inches). Pretesting had shown that a more realistic projected image was obtained with a wide-angle exposure, so a 15mm lens was used. Microphones with a cardioid pattern were used and aimed toward the center of the camera field-of-view.



Note. In Sessions where car mockups are not employed, the curb line was placed closer to the screen.

Figure 1. Classroom Configuration of Traffic-Flow Simulator

Teacher's Guides

Teacher's Guides were developed for each of the three programs--Basic, Film, and Simulator. Each guide includes a foreword to the Principal, and four chapters. Each has content specific to its particular program, as well as general information common to all three programs.

The first part of each guide contains these identical sections:

How to Use This Guide--Brief instructions to the teacher.

Introduction--Why the program was developed; program objectives (the safe street-crossing behavior sequence); summary of program activities; materials required; progress charts; parents' pamphlet; scheduling.

Preprogram Activities--Introductory safety discussion with the children, and other optional activities.

Each guide then proceeds with detailed instructions for conducting the eight sessions. Each session description includes an introduction, the objective of the session, materials and personnel requirements, preparation activities, complete instructions for conduct of the session, and a list of DOs and DON'Ts for session administration.

Each guide concludes with follow-on reinforcement and post-summer-vacation refresher training, both of which are constant for all three programs. Suggestions are provided for continuing the program both throughout the year of its first administration and in subsequent years.

PROGRAM ANALYSES, RESULTS, AND CONCLUSIONS

Pilot Test data were collected and analyzed to permit three major categories of program evaluation:

1. Performance of the accident avoidance behavior sequence, i.e., the extent to which the programs increased the frequency-of-use in actual street-crossing of the behavior sequence the children were taught in training.

2. Incidence of unsafe street crossing, i.e., the effect of training on the frequency of occurrence of street crossings judged to be unsafe.

3. Materials adequacy--collection of the reactions of observers, teachers, and students to the program sessions and materials.

Description of the analyses and the results and conclusions deriving from them are presented below, separately for each evaluation category.

Performance of the Accident Avoidance Behavior Sequence

Of major importance in the evaluation of the training programs was the determination of how well the children transferred what they (assumedly) had learned during training to actually crossing streets on their own. The children were taught to cross streets using the accident avoidance behavior sequence. Would they, in fact, perform the behavior sequence in the test situations? The evaluation of the behavior sequence had three objectives:

1. To determine which of the three training programs, if any, resulted in a statistically significant increase in the use of the behavior sequence.

2. To compare the three programs to ascertain which of the programs, if any, was significantly better than the others.

3. To identify age and grade differences in the tendency to employ the sequence.

Analyses related to each of these objectives are treated separately in the subsections which follow. The basis for each of the analyses is the number of errorless crossings performed by a child during a test. During each of the three tests (i.e., the pretest and two posttests), each child was observed as he crossed the street twice (i.e., going to

the van and returning to class). Each child was scored on how many times (0, 1, or 2) he/she performed the accident avoidance behavior sequence without error.

Two types of evaluation are provided within each of the subsections:

1. Program effectiveness--evaluation of improvement in the frequency of use of the sequence with training. This evaluation is based on comparisons between the pretest or the "before" test (immediately before training) and the first posttest, or the first "after" test (immediately after training).

2. Program permanency--evaluation of decrease in the frequency of use of the sequence as a function of time. The program permanency evaluation is based on comparison between the first posttest and the second posttest, or second "after" test (one month following training).

The Individual Programs

Table 1 shows the distribution of the three errorless performance scores for all three tests, separately by program. It can be seen from the table that:

1. The baseline or "before" level of performance of the sequence was essentially zero. The sequence is very seldom exhibited prior to training.

2. Immediately after training, each program shows an increase in the frequency of trials in which the child performs the sequence correctly at least once. For two of the programs, about half the children are performing the sequence correctly on at least one of the two crossings. This improvement is statistically significant for all programs.

3. One month after training, some "backsliding" has occurred; i.e., the frequency of occurrence of the sequence has decreased as compared to immediately after training. This decrease is significant for the Film and Simulator Programs, but not for the Basic Program. The reason for this lack of significance for the Basic Program seems due to the fact that the improvement with this program was small, so the decrement was also small.

It is apparent that each of the programs was effective. For the Basic Program 89.6 percent of the children exposed to it showed 0 errorless crossings one month after training, as compared to 98.8 percent before training. This represents an improvement of 9.2 percent. For the Simulator and Film Programs, this improvement is 29.4 percent and 29.8 percent respectively.

Table 1

Summary of Errorless Performance Results
for Individual Programs

Program	Number of Errorless Crossings	Immediately before Training	Immediately after Training	One Month after Training
Basic	0	98.8%	82.3%	89.6%
	1	1.2%	15.2%	9.1%
	2	0.0%	2.5%	1.3%
		N=80	N=79	N=77
Simulator	0	97.2%	51.4%	67.8%
	1	2.8%	42.1%	30.4%
	2	0.0%	6.5%	1.7%
		N=109	N=107	N=115
Film	0	100%	48.9%	70.2%
	1	0.0%	41.1%	26.6%
	2	0.0%	10.0%	3.2%
		N=87	N=90	N=94

Results of Chi-Square Analyses

	Comparing "Before" and First "After" Tests			Comparing First and Second "After" Tests		
Program	Chi-Square	dF	Level of Significance	Chi-Square	dF	Level of Significance
Basic	10.77	1	.01	1.18	1	NS
Simulator	57.41	1	.001	5.56	1	.05
Film	57.45	1	.001	7.84	1	.01

The Programs Compared

The basis for the comparative analysis of program effectiveness was the frequency of each type of change possible between the pretest and the first "after" test. Each child's first posttest performance was compared to his pretest performance to determine whether the number of his errorless crossings had decreased (indicating a performance decrement), remained unchanged, or increased. Table 2 summarizes the results of the analyses for program effectiveness. The occurrence of performance decrement was found to be less than 2% of the total sample combination so these cases were included with the not-changed category for the Chi-square analyses.

Table 2

Summary of Errorless Performance
Comparative Program Effectiveness Results

	Type of Change*				
	Much Degraded	Degraded	Not Changed	Improved	Much Improved
Basic N=69	0.0%	1.4% (1 case)	78.3%	17.4%	2.9% (2 cases)
Simulator N=93	0.0%	1.1% (1 case)	49.5%	43.0%	6.5%
Film N=77	0.0%	0.0%	49.4%	41.6%	9.1%

Comparison	Chi-Square	dF	Level of Significance
Overall	17.88	2	.001
Basic-Simulator	13.23	1	.001
Simulator-Film	0.02	1	NS

*"Much degraded" means pretest/first posttest change from two errorless crossings to 0 errorless crossings; "degraded," from 2 to 1 or 1 to 0 errorless crossings; "not changed," 2 to 2, 1 to 1, or 0 to 0; "improved," 0 to 1 or 1 to 2; "much improved," 0 to 2.

The table shows:

1. The three programs differ significantly in their effectiveness. The overall Chi-square is highly significant.

2. The Basic and Simulator programs differ significantly in their effectiveness. Since the difference between the Film and Basic Programs are of the same magnitude as those between the Basic and Simulator Programs, the former differences are assumed also to be statistically significant.

3. The difference in effectiveness between the Simulator and Film Programs is quite small.

The Film and the Simulator Programs are shown, then, to be much more effective than the Basic program and not different between themselves in terms of their ability to increase the frequency of occurrence of the behavior sequence.

The same categorization of type of individual change used in the comparative analysis was also performed to compare the programs in terms of their permanency. In this case, however, the comparison was between the first and second "after" tests. The results of this analysis are given in Table 3.

Table 3

Summary of Errorless Performance
Comparative Program Permanency Results

	Type of Change*				
	Much Degraded	Degraded	Not Changed	Improved	Much Improved
Basic N-68	0.0%	14.7%	80.9%	2.9%	1.5% (1 case)
Simulator N=99	5.1%	24.2%	58.6%	11.1%	1.0% (1 case)
Film N=82	4.9%	24.4%	61.0%	9.8%	0.0%

Results of Chi-Square Analysis

Comparison	Chi-Square	dF	Level of Significance
Overall	5.56	2	NS

*"Much Degraded" means first posttest - second posttest change from 2 errorless crossings to 0 errorless crossings; "Degraded," from 2 to 1 or 1 to 0 errorless crossings; "Not Changed," 2 to 2, 1 to 1, or 0 to 0; "Improved," 0 to 1 or 1 to 2; "Much Improved," 0 to 2.

The table provides the following information:

1. The majority of children did not change between the tests, i.e., their street-crossing performances remained the same.

2. Some children actually improved in the month following training. This may be due to the fact that the teachers were sensitized to safe street crossing as a result of the program and emphasized it after training. Guidelines for follow-on activities were included in the Teacher's Guide for the programs, but the teachers were not asked to perform these activities. Some may have employed follow-on activities in the month following training. Also, many of the children were wearing their Safe Street Crossing Award Patches after the end of training and the patches may have served as a reminder to other children to perform correctly; i.e., the patches may have stimulated additional, non-structured practice.

3. As noted in Table 1, many children showed performance decrement. However, the overall difference in amount of decrement was found to be relatively small, too small to be statistically significant.

Sex and Grade Comparisons

Tables 4 and 5 summarize the results of effectiveness and permanency analyses by sex and grade, respectively. The analyses for effectiveness catagorize each child's pretest - first posttest performance change as either degraded/not changed or improved. The permanency analyses categorize individual behavior change between first and second "after" tests as either degraded or not changed/improved.

The results of the analyses, as reflected in the tables, are:

1. Girls improve with training more than boys, i.e., they demonstrate more errorless performances than boys following training. This difference is statistically significant, although at a relatively low level.

2. There is no difference between boys and girls in the amount of performance decrement shown over time.

3. There appears to be no difference between grades regarding either program effectiveness or permanency.

Table 4

Summary of Errorless Performance
Results by Sex

Comparing "Before" and First "After" Tests

	Degraded or Not Changed	Improved
Girls N=113	51.4%	48.7%
Boys N=126	65.1%	34.9%

Chi-Square	dF	Level of Significance
4.64	1	.05

Comparing First and Second "After" Tests

	Degraded	Not Changed or Improved
Girls N=122	29.5%	70.5%
Boys N=126	21.4%	78.6%

Chi-Square	dF	Level of Significance
2.14	1	NS

Table 5

Summary of Errorless Performance
Results by Grade

Comparing "Before" and First "After" Tests

	Degraded or Not Changed	Improved
Kindergarten N=57	64.9%	35.1%
First N=54	66.7%	33.3%
Second N=61	44.3%	55.8%
Third N=67	59.7%	40.3%

Chi-Square	dF	Level of Significance
7.59	3	NS

Comparing First and Second "After" Tests

	Degraded	Not Changed or Improved
Kindergarten N=61	19.7%	80.3%
First N=59	27.1%	72.9%
Second N=61	26.2%	73.8%
Third N=67	28.3%	71.6%

Chi-Square	dF	Level of Significance
1.48	3	NS

Effect of Training on The Incidence of Unsafe Street Crossing

The preceding section examined the effect of training and time after training on the frequency of occurrence of correctly performed accident avoidance behavior sequences. Since the behavior sequence was what was being taught in the training programs, the programs had to be evaluated on how effectively and permanently they established the sequence in the children. It can be argued, however, that even though correct performance of the behavior sequence permits an adequate (i.e., safe) street crossing, other sequences of behaviors also exist which permit safe street crossing. For example, although the accident avoidance behavior sequence requires the child to search after he stops, it is possible to conceive of street situations in which searching before the curb would be acceptable. One such circumstance would be the existence of a clear view of traffic in both directions, such that the child could adequately search and detect as he approached the curb. Another example would be the child who looks first in the direction of a vehicle he hears (the behavior sequence always requires him to look left first). If he waits and reinitiates a thorough search in both directions after the vehicle passes or even while it is passing, he has performed a "safe" sequence even though it is not errorless, i.e., in exact conformance with the accident avoidance behavior sequence.

In order to permit evaluation of decrease in unsafe street crossings as a result of training, each street crossing occurring in the pretest and posttests was separately judged, both in terms of correctness (i.e., exact conformance to the sequence) and whether it was safe. The following criteria were used to define a "safe" crossing:

1. The child must search adequately in both directions prior to entering zone of moving traffic. Adequate search is one in which the child could detect approaching traffic if it were present. Presearch is acceptable if the child has a clear view of traffic lanes from his presearch position.

2. The child must appear to be searching for approaching vehicles as opposed to performing ritualized responses.

3. The child should stop at the curb or boundary to give himself adequate time to search in both directions before entering the danger zone.

4. No specific sequence of left and right looks is required, as long as the child has searched both traffic lanes no longer than two seconds before he enters them, i.e., has minimized the opportunity for traffic to suddenly appear between search and crossing.

5. First attention to heard traffic is acceptable.

6. A crossing should not be judged acceptable merely because it was acceptable under the peculiar street situation (e.g., positioning of parked cars, length of clear view up and down the street, etc.). The sequence employed must be judged to be acceptable in standard settings in general.

The subsections which follow provide parallel analyses with those of the last section. The purpose here, however, is to evaluate the effectiveness and permanency of the programs in terms of decreasing the occurrence of unsafe street crossings.

The Individual Programs

Table 6 shows for each program subsample, the percentage of 2, 1, and 0 unsafe crossing trials for each test. Since each child was observed crossing the street twice, he could perform in an unsafe manner on both crossings (a score of "2"), one crossing, or on neither crossing. Preliminary analysis had shown that the base rate for unsafe street crossings across all children included in the pretest was 94.2%, i.e., 5.8% of the children performed safely on both of their pretest crossings. An additional 30.4% crossed safely on one of the two crossings. Because the base rate was not 100%, it was decided to include in the analyses only those children who were present at all three tests, to simplify interpretation of the data. The data in Table 6 were derived based on program subsamples so defined.

It can be seen from the table that:

1. About 1/3 of the children in each program subsample performed safely on at least one of the two crossings.

2. For the Basic Program:

   - the percentage of "2 unsafes" immediately after training decreased to 1/3 its pre-training level.

   - the percentage of "1 unsafe" increased by about 50%, indicating that a good many of the children were performing safely at least part of the time.

3. For the Simulator and Film Programs:

   - the percentage of "2 unsafes" decreased by 92.2% and 71.8% respectively.

   - over 60% of the children in both subsamples were performing both crossings safely.

4. The Chi-square tests show the reduction in unsafe street crossings to be highly significant for all programs.

5. All programs showed reversal toward more unsafe behavior over time. The decrement is significant for the Basic and Simulator Programs, but not for the Film Program.

Table 6

Summary of Unsafe Street Crossings for Individual Programs

Program	Number of Unsafe Crossings	Immediately Before Training	Immediately After Training	One Month After Training
Basic N=60	2	65.0%	21.7%	45.0%
	1	33.3%	51.7%	38.3%
	0	1.7%	26.7%	16.7%
Simulator N=88	2	58.0%	4.5%	14.8%
	1	30.7%	29.5%	33.0%
	0	11.4%	65.9%	52.3%
Film N=69	2	66.7%	18.8%	17.4%
	1	30.4%	20.3%	34.8%
	0	2.9%	60.9%	47.8%

Results of Chi-Square Analysis

	Comparing "Before" and "After" Tests			Comparing First and Second "After" Tests		
	Chi-Square	dF	Level of Significance	Chi-Square	dF	Level of Significance
Basic	28.61	2	.001	7.47	2	.05
Simulator	74.06	2	.001	6.31	2	.05
Film	56.22	2	.001	3.75	2	NS

The patterns of change between the pretest and first posttest and between the first and second posttests can be examined via Tables 7 and 8.

Table 7

Tabulation of Percentage Occurrence of Each Unsafe Street Crossing Score Combination, Between the "Before" and First "After" Tests

Program	Pretest Score	First Posttest Score: 0 Unsafe	1 Unsafe	2 Unsafe
Basic	0 Unsafe	0 cases 0.0%	1 case 100%	0 cases 0.0%
	1 Unsafe	8 cases 38.1%	10 cases 47.6%	3 cases 14.3%
	2 Unsafe	8 cases 21.1%	20 cases 52.6%	10 cases 26.3%
Simulator	0 Unsafe	8 cases 80.0%	2 cases 20.0%	0 cases 0.0%
	1 Unsafe	20 cases 74.1%	6 cases 22.2%	1 case 3.7%
	2 Unsafe	30 cases 58.8%	18 cases 35.3%	3 cases 5.9%
Film	0 Unsafe	2 cases 100.0%	0 cases 0.0%	0 cases 0.0%
	1 Unsafe	16 cases 76.2%	3 cases 14.3%	2 cases 9.5%
	2 Unsafe	24 cases 52.2%	11 cases 23.9%	11 cases 23.9%

Table 8

Tabulation of Percentage Occurrence of Each Unsafe Street Crossing Score Combination, Between the First and Second "After" Tests

Program	First Posttest Score	Second Posttest Score: 0 Unsafe	1 Unsafe	2 Unsafe
Basic	0 Unsafe	5 cases 33.3%	7 cases 46.7%	3 cases 20.0%
	1 Unsafe	5 cases 16.1%	12 cases 38.7%	14 cases 45.2%
	2 Unsafe	1 case 7.7%	3 cases 23.1%	9 cases 69.2%
Simulator	0 Unsafe	26 cases 52.0%	17 cases 34.0%	7 cases 14.0%
	1 Unsafe	11 cases 47.8%	7 cases 30.4%	5 cases 21.7%
	2 Unsafe	3 cases 60.0%	1 case 20.0%	1 case 20.0%
Film	0 Unsafe	28 cases 70.0%	8 cases 20.0%	4 cases 10.0%
	1 Unsafe	2 cases 14.3%	7 cases 50.0%	5 cases 35.7%
	2 Unsafe	1 case 7.7%	9 cases 69.2%	3 cases 23.1%

The Programs Compared

To compare programs, each child's change in performance was categorized as was done for the comparative analysis of errorless performance. One difference, however, is that the present analysis excludes those children who showed totally safe street crossing behavior in the pretest. It was assumed that these children already knew how to cross the street safely; and, since the purpose of the analysis was to examine improvement in those children who initially did not know how, the "0 Unsafe" children could be eliminated. Examination of the 13 cases eliminated showed that 9 of them did, in fact, score "0 Unsafe" in both of the posttests. This is a strong indication that they had been carefully trained prior to the pretest.

Table 9 summarizes the results for the pretest/first-posttest comparison of the individual behaviors. The degraded category is shown for completeness; since children scoring "0 Unsafe" in the pretest were excluded, the 0-2 score combination was not possible, and neither was the 0-1 combination which would have been defined as "degraded." It can be seen from the table that:

1. A minor amount of performance decrement occurred with training. This is likely the result of sampling error.

2. Over half the children improved in each program with Simulator and Film Programs showing the most improvement.

   - Basic--61.0%.

   - Simulator--87.2%.

   - Film--76.2%

3. The Simulator and Film Programs resulted in more extreme improvements, i.e., 2 unsafes to 0 unsafes, than the Basic Program.

4. The overall Chi-square shows that the programs differ significantly in their ability to reduce unsafe street crossings.

5. Paired comparisons show that the Simulator and, assumedly, the Film Programs differ significantly from the Basic Program, but the Simulator and Film Programs do not differ greatly between themselves.

Table 9

Summary of Unsafe Street Crossing
Comparative Program Effectiveness Results

	Type of Change*				
	Much Degraded (0-2)	Degraded (1-2)	Not Changed (1-1, 2-2)	Improved (2-1, 1-0)	Much Improved (2-0)
Basic (N = 59)	---	5.1% (3 cases)	33.9%	47.4%	13.6%
Simulator (N = 78)	---	1.3% (1 case)	11.5%	48.7%	38.5%
Film (N = 67)	---	3.0% (2 cases)	20.9%	40.3%	35.9%

Results of Chi-Square Analysis

Comparison	Chi-Square	dF	Level of Significance
Overall	18.02	4	.01
Basic-Film	9.27	2	.01
Simulator-Film	3.91	2	NS

*The numbers in parentheses below the category title refer to the type of change included, e.g., "improved" includes change from 2 unsafe crossings to 1, and 1 unsafe crossing to 0.

Table 10 provides a similar comparison between the first and second posttests. Important finds here are:

1. As in the permanency comparison for errorless performance, some children in each program continue to improve over time, without (formal) training. Possible reasons for this were discussed earlier.

2. Each program shows decrement over time:

   - Basic--40.7%.

   - Simulator--37.2%.

   - Film--25.4%.

3. Although the Simulator and Film Programs result in less decrement than the Basic Program, the difference between the programs is not statistically significant.

Table 10

Summary of Unsafe Street Crossing
Comparative Program Permanency Results

	Much Degraded (0-2)	Degraded (1-2)	Not Changed (1-1, 2-2)	Improved (2-1, 1-0)	Much Improved (2-0)
Basic (N = 59)	5.1%	35.6%	44.1%	13.6%	1.7% (1 case)
Simulator (N = 78)	9.0%	28.2%	43.6%	15.4%	3.8% (3 cases)
Film (N = 67)	6.0%	19.4%	56.7%	16.4%	1.4% (1 case)

Results of Chi-Square Analysis

Comparison	Chi-Square	dF	Level of Significance
Overall	3.91	2	NS

In each program subsample, the greatest percentage of children did not change over time. Examination of the composition of the "Not Changed" category in Table 10 can provide further insight concerning program effectiveness and permanency. The breakdown has been provided in Table 11. Two facts stand out upon examining the table:

1. For the Film and Simulator Programs, 3/4 of the "Not Changed" category consisted of children who performed safely on both first posttest crossings and also performed both crossings safely a month after training. Thus, at least for these programs, a high level of performance was produced initially and maintained over time.

2. Somewhere between 65% and 97% of the children in each subsample were performing at least one crossing correctly after training, and continued to do so after one month. These children could have shown performance decrement, but did not. This, again, speaks for the stability of the programs.

Table 11

Comparison of the Composition of the Program Permanency "Not Changed" Category

	(2-2)	(1-1)	(0-0)
Basic (N = 26)	34.6%	46.2%	19.2%
Simulator (N = 34)	2.9%	20.6%	76.5%
Film (N = 38)	7.9%	18.4%	73.7%

Sex and Grade Comparisons

The results of the analyses of sex and grade differences in unsafe street crossings are provided in Tables 12 and 13. The tables provide separate tabulations relating to program effectiveness and permanency, and are parallel to Tables 4 and 5 discussed earlier. The findings are:

1. The difference in program effectiveness by sex is small and not statistically significant. This finding tends to cast doubt on the validity of the earlier findings (in Table 4) of a significant difference between boys and girls in improvement in errorless performance. If there is any difference between the sexes, it is not great enough to be of concern to future program development.

Table 12

Summary of Unsafe Street Crossing Results by Sex

Comparing "Before" and First "After" Tests

	Degraded or Not Changed	Improved
Girls N=113	31.0%	69.0%
Boys N=122	24.6%	75.4%

Chi-Square	dF	Level of Significance
1.79	1	NS

Comparing First and Second "After" Tests

	Degraded	Not Changed or Improved
Girls N=123	32.5%	67.5%
Boys N=126	32.5%	67.5%

Chi-Square	dF	Level of Significance
0.00	1	NS

Table 13

Summary of Unsafe Street Crossing
Results by Grade

Comparing "Before" and First "After" Tests

	Degraded or Not Changed	Improved
Kindergarten N=57	21.1%	78.9%
First N=54	35.2%	64.8%
Second N=70	34.3%	65.7%
Third N=68	35.3%	64.7%

Chi-Square	dF	Level of Significance
3.91	3	NS

Comparing First and Second "After" Tests

	Degraded	Not Changed or Improved
Kindergarten N=61	36.1%	63.9%
First N=59	27.1%	72.9%
Second N=61	18.0%	82.0%
Third N=68	45.6%	54.4%

Chi-Square	dF	Level of Significance
12.32	3	.01

2. The difference in program permanency by sex is not significant, in agreement with the errorless performance evaluation in Table 4.

3. Program effectiveness differences by grade are not significant, also in agreement with the errorless performance evaluation (see Table 5).

4. A highly significant trend exists for performance decrement over grades. There is a stepwise reduction in unsafe behavior from grades K through 2, and a marked increase in unsafe behavior in grade 3. Given the lack of agreement between the "corrects" only and the "corrects"-and-"adequates" relationships, and the fact that the combined improvement shown for the Kindergarten children (see Table 5) was higher than the other grades, the stepwise progression is probably the result of sampling error. The high level of decrement for the third grade cannot be explained by the available data, and may well imply that the programs do not, in fact, have as lasting an effect on third-graders as they do for the younger children. Support for this contention comes from the experiences of the staff personnel observing the program sessions. They expressed the opinion that third-graders tended to most quickly become disinterested during the sessions, and sometimes expressed the attitude that they were too old to be learning how to cross streets (i.e., that this was for younger children).

Materials Adequacy

Data on the adequacy of the programs and the various program materials were collected in the form of comments, suggestions, and recommendations from the ASA personnel who observed each program session, and the participating teachers. In addition, the children's reaction to certain program materials was observed and they were polled concerning their familiarity with and liking of Captain Kangaroo. The results of these data collection activities are described below by program session and program material.

Findings by Session

The major findings for each of the eight program sessions are listed by session and for the programs in general in Table 14. Unless otherwise noted, the findings can be considered as applying to each of the three programs. The description of the content of each session, as pilot tested, can be found beginning on Page 29. It is obvious from the table that the findings and recommendations, with only one exception, were such as to require only minor modification to the content and structure of the programs. This one exception was the recommendations which would add one or sometimes two sessions to the program. The reasons for the additional sessions, as stated in the table, are sound and it is the belief of the ASA project staff, based on their experiences in the pilot test, that lengthening the program as suggested would not reduce its acceptability to the teachers.

Table 14

Materials Adequacy Findings by Session

Session	Findings
First	1. The session was overlong especially in the film program where session length reached 45 minutes in some cases. Recommendation: Session 1 should be divided into two sessions as follows: New first session--safety discussion and teacher modeling of behavior sequence. New second session--modeling of sequence and description of program by teacher (or via the film in the film program), and behavior rehearsal. 2. Kindergarten and some first grade children can't distinguish left and right. Recommendation: Tie colored yarn to each child's left hand, i.e., the direction he looks first. 3. For film program, too much session time was spent setting up the projector and rewinding the film. Recommendation: Have aide or older student perform this function so that teacher can proceed with session.
Second	1. Children too excited by the simulator and "push around" cars to get involved in practice. Recommendation: For the simulator program, show the children how the simulator works and desensitize them to it before beginning the session. For the other programs, permit each child to ride in one of the cars before beginning the session. 2. Practicing individually tends to make the session overlong. Recommendation: Pair the children for one of the two practice rounds--the children learn from one another and the round of turns requires only half as long. 3. The "push around" cars have reinforcement value. Recommendation: Reinforce correct performance with the privilege of "driving" one of the cars while others practice.

Table 14 (continued)

Session	Findings
Third and Sixth (the Ball Toss Game)	1. Need to provide a reward for getting ball in basket as well as for crossing street. Recommendation: Have two kinds of tokens with larger and/or more attractive ones for rewarding the safe street crossing. (Tokens are used to reward street crossings in the third session only.) The use of separate tokens will also help the teacher to score the game when it is played competitively. 2. Teacher has difficulty keeping track of which children have and have not had the opportunity to chase ball into the street. Recommendation: Have each child toss ball until he misses basket (nearly all misses go into street).
Fourth and Seventh (the Shuttle Game)	1. The Shuttle Game is too complex to set up and administer. Recommendation: Make the following changes in the game: a. Select the base that the child is to run to randomly by drawing a red, blue, or white colored marble from a container. The container would contain 2 white, 1 blue, and 1 red marble so that there would always be a 50-50 chance that the child would have to go to the white base (across the street). b. Using two teams even when they are not competing speeds the play of the game but one person should call bases and observe street crossings for each team. c. Keep game moving by continuing to call bases while a child called to the white base is waiting for a clear street in order to cross.
Fifth and Eighth (Follow-the-Leader Game)	1. Tagging sometimes led to disruption of the game and the elimination of tagging did not affect the children's desire to hurry so that the person following them would not catch up. Recommendation: Eliminate tagging from the game.

Table 14 (continued)

Session	Findings
Program General	1. All sessions required two persons to administer effectively. Recommendation: The teacher should have at least one person to aid him/her for each session. This person could be either a teacher's aide, parent volunteer, or older student (i.e., 7th or 8th grade).
	2. For the outside sessions, set up would be facilitated if the street barricades did not have to be obtained from the city. Recommendation: Include simple street barricades and traffic warning signs as part of program materials.
	3. Controlling traffic flow on the street during outside sessions with barricades/signs alone is not sufficient. Recommendation: Arrange for a crossing guard, aide, parent volunteer, or an older child school patrol member to stand by at each barricade to warn traffic that must use the street that children are present.
	4. In classes where session absenteeism has been high (as is sometimes the case with kindergartens) an additional program session may be required. Recommendation: Provide the teacher with the option of conducting an additional outside session using any one of the practice games on a day when class attendance is good.

Findings for Program Materials

Table 15 summarizes the findings and recommendations relating to the major program materials. As with the session findings, recommendations for modification in program materials were usually minor. The only exception to this tendency was the recommendation for revision in the traffic flow film.

Table 15

Materials Adequacy Findings by Program Material

Program Material	Findings/Recommendation
Teachers' Guide (see Appendix A)	1. It is sometimes difficult to locate the directions for the session to be conducted. Recommendation: Use tabs to divide session descriptions and introductory material.
	2. There is wide difference in the ability of the teachers to effectively communicate the practice game instructions to the children. Recommendation: Provide game directions for the teacher to read to the children.
	3. Some of the preparation activities are better performed by the principal or his designate than by the teacher. Recommendation: Provide a guide to the principal covering such topics as how to schedule sessions efficiently and how to arrange for police cooperation.
	4. Nowhere in the teachers' guide are there instructions for central school system personnel on how to administer the program at that level. Recommendation: Provide a separate guide to the school system program coordinator covering such topics as procurement of materials and arranging with the schools for shared use of the more expensive materials (e.g., the simulator, pedestrian safety film, and the "push around" mock-up cars).
Parents' Pamphlet (see Appendix B)	1. Neither parents nor teachers made comments concerning the content or structure of the Parents' Pamphlet. Recommendation: None
Street Safety Award Patch and Certificate (see Appendix B)	1. All children were asked in Session 1 (after being shown the patch and certificate), "How many of you would like to earn a safety badge and certificate?" (by show of hands). In all classes, 80% or more raised their hands normally accompanied by enthusiasm and excitement. Observers judged the patch to be more interesting to the children than the certificate. Recommendation: None

Table 15 (continued)

Program Material	Findings/Recommendation
Safety Token (see Appendix B)	1. The safety tokens were introduced in Session 2 and the children were asked "How many would like to earn safety tokens?" In all classes at least 80% of the children raised their hands and showed interest and excitement. As noted in Table 14 two types of tokens are recommended; one to reward the play of the game and the other, safe street crossing. The tokens appeared to have intrinsic (primary) reinforcement value for the children as illustrated by the fact that most of the children wanted to keep their tokens and many saved them from session to session. Recommendation: None, except as noted in Table 14.
Progress Chart (see Appendix B)	1. The progress chart was to help the children keep track of their progress toward earning the badge and certificate and to provide them with incentive to continue to perform. In practice, however, the chart was not visible enough to really achieve this purpose, i.e., the children often saw it only after the session when the teacher brought it out to record their checkmarks. Recommendation: Reproduce the progress chart in poster size (20 inches by 30 inches) and make it more colorful. Encourage the teacher to hang it in the classroom during those weeks when the program is in progress.
"Push Around" Car Mock-Ups (see Appendix C)	1. The children's response to the push around mock-up cars used in the Basic and Film Programs was very enthusiastic as demonstrated by the fact that most teachers found it necessary to permit the children a turn riding in the cars before the training activities could continue. The dimensions and general design of the cars were adequate for their intended use but the materials from which they were constructed did not make them sturdy enough to withstand long-term heavy use. Recommendation: Examine other construction materials/techniques which would provide a cost-effective car with greater durability.

Table 15 (continued)

Program Material	Findings/Recommendation
Traffic Flow Simulator (see Appendices C and D)	1. The simulator, as tested, had continuous loop film cartridges which repeated four, three-minute traffic flow scenes. Synchronization of the two projectors was achieved by means of a speed control on the operator's panel which adjusted the speed of one of the projectors, and by having both projectors shut off individually at the end of a scene when each projector reached a synchronization mark on the film. A warning horn was included on the operator's panel so that the teacher could signal an incorrect street crossing. Recommendations: Several recommendations resulted from the pilot testing: a. Having the projectors stop between scenes was unnecessary and wasted time. The projector speed, once preadjusted using the speed control, was sufficient to keep the projectors "in sync" even though the projectors ran continuously throughout the session. The automatic shut off was useful only to assure that when the simulator was shut down both films would start again at the same point. b. The horn was not necessary. Normal program procedures to negatively reinforce an incorrect response worked well enough that the horn as a noxious stimulus was not required. Also, the teacher was usually too busy during the session to effectively use the horn. c. The traffic flow film itself contained points in time in which too much traffic was present, resulting in overlong delays while the children waited for a safe chance to cross. The film should be modified to remove such heavy traffic segments, i.e., new scenes should be filmed and substituted for those at fault. d. The simulator mock-ups are too long requiring too much separation between screens. The required separation reduces the visual effectiveness of the traffic flow and reducing the length of the mock-ups

Table 15 (continued)

Program Material	Findings/Recommendation
	would reduce the amount of space required to set up the simulator. The lengths of the mock-ups should be reduced. e. Set up and tear down of the simulator should be accomplished by two persons. Other children (eighth grade), if properly instructed, could perform this task.
Child Pedestrian Safety Film (see Appendix E)	1. Several types of data were collected to determine the effectiveness of the child pedestrian safety film. These data types and the findings from their analysis are as follows: a. Captain Kangaroo survey. A total of 278 K-3 children were polled in the three participating schools to determine their familiarity with and liking for Captain Kangaroo. The purpose of the survey was to verify the effectiveness of Captain Kangaroo as a model for this age group. Three questions were asked of the children: - "Can you tell me who this is?" (holding up picture) 87% of the children identified Captain Kangaroo. There were no significant differences in frequency of correct identification by sex, grade, or school. - "What do you remember about Captain Kangaroo's TV program?" 36.4% of the children remembered 1 or 2 details from the program, 7.1% remembered 3 or more details. Grade and sex differences were nonsignificant but the schools differed greatly ($p < .001$) in terms of remembered detail. The two predominantly black schools were higher in remembered details than the one predominantly white school. - "What do you think of Captain Kangaroo?" 58.6% of the children liked Captain Kangaroo, 33.1% were neutral with small grade, sex, or school differences.

Table 15 (continued)

Program Material	Findings/Recommendation
	Thus, Captain Kangaroo appears to be known and generally liked by the target group.
	b. Attention/reactions to the film. The film was shown in Session 1 and again in Session 2. The session observer recorded the proportion of the class attending to the film every 3 minutes during both showings and also the proportion of the class which responded to the questions asked of the audience during the two freeze frame segments. The class was also asked at the end of Session 1 whether they wanted to see the movie again. The results of these measures were: - Attention--for the four classes who saw the film, attention during the first showing seemed to improve as the film progressed. In the least attentive classes, 40-60 percent of the children attended initially, but by the middle of the film, all classes had 80-100 percent attending. For the second showing, 80-100 percent attending was observed from beginning to end. - Freeze frame reactions--the children's responses to the freeze frame questions varied considerably with the most common level of response in the first showing between 20 and 60 percent. The level of responding in the second showing was somewhat higher (40-60 percent). - Reaction to the question "How many would like to see the film again tomorrow?" 80-100 percent of the children in all classes responded in the affirmative. Given these findings, it is apparent that the film, as tested, was well accepted by the children and there is at least indirect evidence that Captain Kangaroo is in fact an effective model for this age group. Recommendation: None

PROGRAM DEVELOPMENT RECOMMENDATIONS

Having examined the basic results of the pilot testing, this section will bring together these findings into a specific set of program modification recommendations. An analysis will then be made of the cost of producing each of the programs as modified. Finally, these cost data will be integrated with the other pilot test findings to produce recommendations for two of the three training programs which should be further tested.

Recommendations for Program Improvement

With regard to modifications in the three training programs, the following three recommendations are tendered:

1. The accident avoidance response sequence. ASA recommends that tracking of the approaching vehicle be deemphasized. The analysis of component behavior permanency shows that tracking behavior tends to degrade quickly with time. Observations in the training sessions and the pre- and posttests indicate that instead of tracking the vehicle as it approaches, there is a strong tendency to continue searching while waiting for the vehicle to pass. Once a child has detected an approaching vehicle and decided to wait for it to pass, whether the child crosses the street safely after the vehicle passes does not seem to be a function of whether he tracks or continues searching. That is, he is just as likely to make an inadequate post detection search whether he searches while the vehicle is approaching or after it has passed. Given these facts it seems unnecessary to try to replace the tendency to continue searching with the tracking behavior. Emphasis on the post detection search would, of course, continue.

2. Conduct and structure of the training sessions. ASA recommends that the training sessions be modified as described in Table 14, including these modifications:

    a. Replacing Session 1 with two shorter sessions.

    b. Emphasizing the need for aides, especially older children, to help with the administration of the sessions and for traffic control during the outside sessions.

c. Providing the teacher with the option of scheduling an additional session after Session 8 if absenteeism was high for the program sessions.

3. The Program materials. ASA recommends that the program materials be modified as described in Table 15, including:

   a. Development of Principal's and Program Coordinator's Guides in addition to the Teachers' Guide.

   b. Modifying the simulator traffic flow film to replace those scenes having overly heavy traffic flow.

   c. Providing street barricades and traffic warning signs as part of the program materials.

Program Cost Analyses

The costs of materials for implementing each of the three training programs are provided below. The first subsection describes cost of materials common to all programs, and subsequent subsections describe costs associated with program-specific materials. The amounts shown are presumed sufficient to administer the program in a school system with 100 elementary schools such that administration can be completed within two months.[7] The per unit and total costs are based on the production of materials in those amounts. The figures reflect only the costs of production--cost of development is not included since (with the exception of the traffic flow film revision) no development will be required. Costs are best estimates provided by Pittsburgh suppliers as of June 1974.

Program Common Materials

The following materials are required in the same quantities by all three training programs.

Program Coordinator's Guide--10 pages, assembled and bound, 5 copies required (assuming distribution to other personnel at the school system level in addition to the program coordinator) ($2.20 each) $11

[7] This time requirement was introduced in anticipation of program field testing where prompt completion of program administration within the school system has methodological advantages.

Principal's Guide--10 pages, assembled and bound, 100 copies required ($1.05 each)	$105
Teachers' Guide--40 pages, assembled and bound, 800 copies required (assuming eight K-3 teachers per school) ($1.00 each)	$800
Tokens--paper, nonreusable, two sizes, four colors, 560,000 required (assuming 700 per class, eight classes per school, 25 children per class) ($1.80 per set; one set per class)	$1,440
Progress Charts--paper, 20" x 30", 800 required ($1.50 each)	$1,200
Pedestrian Safety Award Patches--2" x 3", embroidered, three color, sew on, 20,000 required (70 cents each)	$14,000
Pedestrian Award Certificates--paper, 8-1/2" x 11", one color, 20,000 required (1.7 cents each)	$340
Barricades and Signs--sawhorse type, lightweight, collapsible, approximately 3 feet high by 8 feet long with traffic warning sign, 40 required (assuming two per school and shared use by the schools) ($38.00 each)	$1,520
Miscellaneous Materials for Practice Games--balls, baskets, tape, and other game items, 100 sets required (assuming one set per school) ($7.50 per set)	$750
Total for Program Common Materials	$20,166

The above total will be included in the cost tabulations for each of the individual programs under the heading "Program Common Materials."

Basic Program

The Basic Program requires the following materials:

Program Common Materials	$20,166
"Push Around" Car Mock-Ups--as described in Appendix C, 60 required (assuming 20 sets of three for shared use by the schools) ($105 each)	6,300
Total for Basic Program	$26,466

Simulator Program

The traffic flow simulator which is the heart of the Simulator Program is costed below in terms of the estimated costs of its major components. Pricing includes labor for the control panel which must be specifically fabricated and the projectors which must be modified, but otherwise assumes off-the-shelf availability of components.

Program Common Materials		$20,166
Simulator--as described in Appendices C and D each including:		
Car Mock-Ups, one set, two required ($130 per set)	$130	
Projectors, Super-8mm, sound cartridge, two required, modified for remote operation ($640 each)	$1280	
Rear Projection Screens, 6 feet by 8 feet, two required ($325 each)	$650	
Control Panel with Cables ($380)	$380	
Power Cords, two 25 foot, one 50 foot ($10 each)	$20	
Traffic Flow Films, 12 minutes, sound, color, Super-8mm on continuous loop cartridges ($110 per set)	$110	
Simulator Total, each	$2,570	
20 Simulators required (assuming shared use by schools)		$51,400
Total for the Simulator Program		$71,566

Film Program

The following costs are associated with the Film Program:

Program Common Materials	$20,166
"Push Around" Car Mock-Ups--as described for the Basic Program	$6,300
Pedestrian Safety Film--as described in Appendix E, 20 required (assuming shared use by the schools) ($75.00 per copy)	$1,500
Total for the Film Program	$27,966

Recommendations of Programs for Field Evaluation

The evaluation of program effectiveness clearly shows that while each of the three programs resulted in a reduction in unsafe street crossing, two of the programs, the Simulator and the Film Programs, were significantly better than the Basic Program in this regard and not greatly different from one another. When program permanency is examined, it can be seen that the sample tended to revert to unsafe behaviors regardless of the program of training they had received. Even considering these performance reversals, however, the net reduction in unsafe street crossing behavior attributable to the Film and Simulator Programs is still considerable. Further, it is likely that with the systematic administration of refresher training sessions not possible during the pilot testing, this performance decrement can be reduced.

On the negative side, the Simulator and Film Programs are more expensive to administer than the Basic Program. The Simulator Program would be more complex to administer than the other two.

All things considered, ASA believes that the Simulator and Film Programs, if modified as previously recommended, provide the best approaches to anti-dart-out training for the K-3 target group. ASA recommends that these programs be selected for further testing.

ASA would recommend that further study be undertaken during the program follow-on effort to determine the effectiveness of the selected programs as a function of the age of the children. The study should emphasize identifying the attitudes of the older children (the third grade in particular) toward learning to cross the street and the acceptability of program materials. One possible outcome of this investigation could be modification of program content and materials, if necessary, to better relate to children of this age.